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Relationship of Hatching Egg Weights with Egg Weight Loss and DOC Weights of Chickens from Bangkok Male Crossbreeding with Pelung Chicken Broodstock

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Abstract

This study aims to determine the correlation between hatching egg weight with egg weight loss and DOC weight of Bangkok male crossbreed chickens with Pelung broodstock. This research uses a unit of automatic digital hatching machines (temperature regulation and automatic turning). The research material is Bangkok rooster chicken, amounting to two tails and four Pelung broilers. The chicken is crossed, and then the eggs are collected to be hatched eggs. This study uses digital camera tools, digital scales, and calculators. The coded eggs are hatched for 21 days. The parameters measured in this study were: Hatching egg weight (grams), egg weight of day 18th hatching, egg weight loss (%) / egg shrinkage, DOC weight, the correlation value between the weight of hatching eggs with egg weight loss, the correlation value between the weight of hatching eggs with the weight of DOC. Data analysis using correlation. The results obtained were the average hatching egg weight of 45.91 ± 3.75 grams, the average of hatching eggs on the 18th day 41.13 ± 3.43 grams, egg weight loss 10.40 ± 0.56%, weight DOC 35.36 ± 3.33 grams, correlation of hatching egg weight to DOC0.98 weight, hatching egg correlation with egg weight loss -0.25. Based on the results of the study, it can be concluded that the characteristics of Bangkok crossbreed hatching eggs with Pelung brooders are in the normal range. The correlation of hatching egg weight with very high DOC weight and positively correlated, correlation of hatching egg weight with low egg weight loss and negatively correlated.

Keywords: crossbreeding, correlation, egg weight loss, hatching egg

A. Introduction

The quality of hatching eggs is one of the parameters in the success of hatching eggs. The selection of eggs to be hatched needs to be done to obtain superior seeds. Factors that cause the low quality of hatching results are not making hatching eggs selection. Indicators used in hatching egg selection include hatching egg weight. According to Wibowo & Jafendi (1994), to get good DOC weights, it is necessary to make the hatching egg selection, such as selecting high-quality eggs. The quality of hatching eggs is positively related to the produced DOC (Junaedi, 2018). DOC weight is strongly influenced by the weight of hatching eggs. The older the parent chicken and the greater the weight of the egg, the higher the DOC will be. The importance of DOC is also influenced by the genetic and dry matter content of the egg. Lestari et al. (1994) suggested that the hatching egg weight was one of the indicators to obtain a significant DOC weight. Besides, according to Wardiny (2002), that a more substantial hatching egg will produce a higher DOC weight than a smaller hatching egg.

The relationship between two variables can be analyzed using correlation. Correlation analysis serves to find out the relationship between one variable with another. Sudjana (1996) suggested that correlation is a science that discusses the magnitude of the relationship between variables and the value of variables called correlation coefficients. Steel & Torrie (1995) state that the close relationship between the two variables (X and Y) can be directly and inversely related.

The selection program in cattle is inseparable from the estimation of correlation values. Evaluation of correlation values can be used as a basis for selection by chicken farmers. Chicken is kept to produce meat, an estimate of the correlation value can be seen from the correlation between hatching egg weight and egg weight loss, and DOC weighting. This study aims to determine the correlation of hatchery egg weight with egg weight loss and DOC weights of Bangkok male crosses and Pelung broodstock. If there is a high correlation, it can be used as a parameter for selection.

A. Methodology

1. Research Procedure

This research uses a unit of automatic digital hatching machines (temperature regulation and automatic turning). The research material is two male Bangkok chicken and four Pelung broilers. The chicken is crossed, and then the eggs are collected to be hatched eggs. This study uses digital camera tools, digital scales, and calculators. Eggs that have been coded and hatched for 21 days. All hatching elements are taken care of properly, starting from sanitation, temperature (37.5-38^{o}C), humidity, turning (automatic turning every three hours), and ventilation.

2. Parameters of Research

The parameters measured in this study are;

1) Hatching egg weight (Gram): Hatching egg weight is measured by weighing the eggs to be hatched and then calculating the average.
2) Hatching egg weight day 18: Hatching egg weight day 18 is measured by weighing hatching eggs on day 18 in the hatching process.
   Egg weight loss (%): Shrinkage of eggs hatched is calculated by the formula:

$$Egg\ Weigh\ Lost = \frac{\text{The initial weight of hatching eggs } - \text{ Weight of hatching eggs on day 18}}{The\ initial\ weight\ of\ the\ hatching\ egg}\ x\ 100\%$$

3) DOC Weight: DOC weight is measured by weighing the newly hatched DOC.
4) A correlation value of hatching eggs compares with Egg weight loss.
5) A correlation value of hatching egg weight compare with DOC weight.

3. Data Analysis

The research method used is experimental with data analysis using correlation analysis. The closeness of the relationship between variables can be seen from the magnitude of the correlation coefficient (r).

$$r = \frac{\text{n (X. Y)} - \text{ (X)(Y)}}{\sqrt{(\text{X}^2) - (\text{X})^2 \quad \text{n (Y}^2) - (\text{Y})^2}}$$

Note: r: Correlation between variable x with variable y
n: number of samples
x: The value of the variable x
y: Value of variable y

This correlation coefficient value is between +1 to -1. If the correlation coefficient is positive (+), it shows a direct relationship, the higher the X value, the higher the Y value. If the negative correlation coefficient (-) indicates the opposite relationship, the higher the X value, the lower the Y value.

The criteria for correlation coefficient values are as follows;

1) 0: There is no correlation between the two variables
2) > 0 - 0.25: Correlation is very weak
3) > 0.25 - 0.5: Correlation is sufficient
4) > 0.5 - 0.75: Strong correlation
5) > 0.75 - 0.99: Correlation is very strong
6) 1: Perfect correlation

B. Results and discussion

The weight of hatching eggs produced from the crossing of Bangkok roosters with Pelung hens belongs to the first category, with an average of 45.91 ± 3.75 grams. The egg weight of the 18th-day hatching eggs was 41.13 ± 3.43 grams. The egg incubation process during the stage has a hatching egg shrinkage. The percentage of hatching eggs from the beginning of incubation until the age of 18 is known as egg weight loss. Egg weight loss is obtained from the average of hatching eggs on the first day subtracted by the average hatching eggs on the 18th day, then divided by the ordinary hatching eggs on the first day and multiplied by one hundred percent. Egg weight loss in this study showed an average of 10.40 ± 0.56%. Egg weight loss values in this study are in the normal range. Egg weight loss occurs due to the evaporation of liquid in the egg. Prasetyo & Susanti (2000) explained that the depletion of eggs during incubation is due to the process of embryo metabolism and embryo development so that evaporation occurs in the egg. Evaporation of liquid in the hatching eggs during the process of embryonic development is inseparable from the influence of temperature and humidity. Heat is a factor that plays a role in early development, egg hatchability, DOC performance. High temperatures affect blood glucose levels, embryonic development, and partial pressure of CO_2 in the blood (Willemsen et al., 2010). The decrease in hatching egg weight during hatching can be seen from the reduction in egg weight due to the evaporation of liquids and organic gases from eggs that have an impact on hatching weight. Shrinkage is closely related to humidity and also affects the quality of DOC (Iskandar, 2003).

The temperature of this study was set with a set point of 37.5 - 38oC. Incubation temperatures higher than optimal can cause excessive water loss and embryo death from dehydration if the temperature is below the optimal result in a decrease in hatchability. It is following the opinion of Nakage et al. (2003) that below optimal temperature decreases hatchability due to reduced water loss (<12%), which causes over-hydration of the embryo and disruption of gas exchange. The low heat in the incubation process causes slowing of tissue maturity (Molenaar et al., 2011). At the end of the incubation of chicken embryos, the plasma metabolic concentration reflects the nutrients used to meet energy requirements during the hatching process. Glycogen deposits are mobilized mainly during this period (Molenaar et al., 2011).

The mean DOC weight of the study results was 35.36 ± 3.33 grams. The average weight of DOC of Bangkok crossbreed chickens with Pelung broodstock is in the normal range. The average weight of hatched eggs was higher than that of other local chickens, such as black Kedu chicken, an average of 28.98 g (Nataamijaya, 2008), 25.5 g of white Kedu chicken, in Sentul chicken 32.2 g (Hidayat & Sopiyana 2010). The DOC weight of the study results is smaller than that of Parent stock Broiler chickens (38.08 ± 2.87 grams) (Junaedi, 2018). The importance of DOC produced at the end of incubation is closely related to the metabolic processes that occur in eggs during hatching, temperature, and humidity. At the end of the incubation of chicken embryos, the concentration of plasma metabolism reflects the nutrients used to meet energy needs during the hatching process. Glycogen deposits are mobilized mainly during this period (Molenaar et al., 2011).

Table 1. Characteristics of hatching eggs from the crossing of Bangkok roosters with brooders

No	hatching egg (Gram)	Hatching egg weight day 18 (Gram)	Egg Weight Loss (%)	DOC Weight (Gram)
1	40	35,5	11,25	30
2	40	36	10,00	30
3	45	40,5	10,00	35
4	50	45	10,00	38,5
5	45	40	11,11	35
6	50	44,5	11,00	38
7	45	40	11,11	34,5
8	45	40,5	10,00	35
9	50	45	10,00	39,5
10	45	40,5	10,00	34
11	50	45	10,00	39,5
Rataan	45,91±3,75	41,13±3,43	10,40±0,56	35,36±3,33
A correlation value of hatching egg weight with DOC weight				0,98
A correlation value of hatching eggs with Egg weight loss				-0,25

The correlation coefficient value between hatching egg weight and DOC weight was very significant (P <0.01). The correlation value between DOC weight and hatch weight is 0.98. Based on this value, there is a reliable correlation between the weight of hatched eggs with the weight of DOC resulting from the crossing of Bangkok male with Pelung broodstock. The results of the study were positively correlated, which was to get a direct correlation with hatching egg weight and DOC weighting. The more egg weight, the hatching weight (DOC) will increase because it has a directly proportional relationship (positive correlation value). Based on these correlation values, it can be seen that the weight of a large hatching egg will produce a significant DOC weight as well, and if the importance of a hatching egg is light, then the DOC to be provided will be light (small). Hatching eggs that weigh little then the DOC produced is small compared to eggs that weigh high.

Hatching egg weight is one of the factors that need to be considered in hatching eggs. The mass of DOC produced from hatching will be directly proportional to the influence of hatching eggs. Hatching egg weight affects hatching weight, where a higher egg weight will result in more top DOC as well and vice versa. Factors that play a role in producing a significant mass of hatching eggs include poultry, feed, environment, and others (Suprijatna, 2010).

A significant correlation value (0.98) from the results of the study showed that if you want to get a large DOC, one of the parameters seen is the hatching egg weight. Large eggs will produce a composition of a higher percentage of contents. So if you want to create a large DOC, the choice of large hatching eggs is a priority. Hatching egg weight selection is preferred if you're going to get a correct DOC. Hatching egg weight is one of the main factors for successful hatching because the high hatching weight will increase the survival of chicks. Hatching weight (DOC) is the weight of chicks aged one day after hatching (Septiwan, 2007).

The positive correlation value can be said that the more the weight of the hatching eggs (x), the more the weight of DOC (y) increases. Hatching weight can be used as a benchmark in selection to get edible DOC seeds because the two parameters correlate very strongly. Following the opinion of Supranto (1996), that the correlation coefficient value is getting closer to number 1, the higher the relationship has. A positive correlation coefficient (+) indicates that there is a linear relationship between the two variables.

Large eggs contain many nutrients needed by the embryo during hatching, so that with many nutrients that cause rapid embryonic development. Large hatching eggs will produce large DOC because large eggs contain more nutrients (vitamins, water, and minerals) that are needed during the incubation process. This nutrient also functions as a food reserve for some time after hatching in poultry. A regular egg weight will result in a uniform hatching child.

The correlation coefficient value between hatching egg weight and egg weight loss was -0.25. Based on this value, there is a weak correlation between hatching egg weight and egg weight loss resulting from the crossing of Bangkok males and Pelung broilers. The results of the

study were negatively correlated, i.e., there was an inverse correlation between hatching egg weight and egg weight loss. The heavier the egg, the egg weight loss will decrease.

D. Conclusion

The conclusion of this research is about the characteristics of Bangkok crossbreed hatching eggs with Pelung brooders. It is in the normal range, the correlation of hatching egg weight with DOC weight is very high and positively correlated, correlation of hatching egg weight with low egg weight loss and negatively correlated.

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